THURSDAY, MARCH 26, 1908.

MISLEADING SEISMOLOGY.

Earthquakes, an Introduction to Seismic Geology. By William Herbert Hobbs. Pp. xxxi+336. (New York: D. Appleton and Co., 1907.) Price 2 dollars net.

EARTHQUAKES have come home to us of late, and we presume that the more general interest, which is now taken in them, is the cause of the publication of this book, on a subject with which the author seems very imperfectly acquainted. The keynote of the work is struck very early in the book, in a summary of the history of modern seismology, which would lead one to suppose that little of any importance had been done outside Germany and Austria; no mention is made of the Seismological Society of Japan, and it is erroneously stated that the International Seismological Association has "published at regular intervals the 'Beiträge zur Geophysik.'" The reports of the sessions of the association have certainly been published as supplementary volumes of this periodical, which is an independent publication, and one of the reasons for the abstention of those seismologists who have held aloof is that the association has been made to appear as the appanage of a private venture.

A large part of the book is devoted to the geological aspect of seismology, and in this we find what the author regards as his contribution to the science. He plots on a map the places at which earthquakes have been felt, or have exhibited a greater degree of violence, draws a series of straight lines through them, which he calls seismotectonic lines, and regards it as a remarkable fact that these lines should intersect at the points through which they are drawn. To a small extent the "seismotectonic" lines represent a truth which has long been known to students of seismology, but by far the greater number of them are mere figments of the pencil and the ruler, and it is remarkable that the author should make no reference, in this connection, to Col. Harboe's theory of extended earthquake origins, a theory which has some resemblance to that of Prof. Hobbs, but is based on more extensive data, and makes no attempt to force the origins into straight lines.

The author's unfamiliarity with the subject is most conspicuous in his treatment of seismometry, whether by observation of the effects of earthquakes or by the use of instruments. We find no mention of West's formula, or even of acceleration as the cause of earthquake damage, but we do find a most remarkable suggestion that the "simplest and one of the best" of seismoscopes may be made by setting up an ordinary lead pencil upon its end, in part immersed in a bath of sand; it is gravely added that an inch scale may be marked on the pencil by simple notches, to enable the depth of the immersion to be recorded. We can imagine the enthusiastic seismologist frantically digging out the ruins of his dwelling and anxiously determining the direction in which the pencil, embedded, say, only three inches in the sand, had been overturned! Seriously, we wonder if Prof. Hobbs has any idea of the shock necessary to overturn a lead pencil standing on a smooth, hard surface, let alone embedded in sand; it seems a very unstable object, and easily upset, but the shock which will throw it down is severe enough to alarm many people, and even to cause damage to buildings; moreover, the direction of overthrow is now known to indicate little or nothing regarding the wave motion of the earthquake. After this it is not surprising that the description of the horizontal pendulum seismograph should be wrong both as to theory and practice.

This brief review of some of the more striking faults in the book must not be supposed to mean that it is altogether bad. As an introduction to seismology, or even to seismic geology, it is the most misleading that we know, but for the reader who comes to it with sufficient previous knowledge it contains suggestive passages, and as we perused the book we were haunted by the consciousness that its author was capable of better work; we searched for the word which would describe its character until a marginal heading, in block type, supplied the want in "crudeness."

GERMAN SCHOOL BOTANY.

(1) *Mikroskopisches und physiologisches Praktikum der Botanik für Lehrer.* By G. Müller. Pp. xvi+224. (Leipzig and Berlin: B. G. Teubner, 1907.) Price 4.80 marks.

(2) *Handboek der botanische Micrographie.* By Dr. J. W. Moll. Pp. xxii+350. (Gröningen: J. B. Wolters, 1907.) Price 4.25 francs.

(3) *Grundzüge der Pflanzenkunde.* By Prof. K. Smalian. Zweite Auflage. Pp. 288; with 36 coloured plates. (Leipzig: G. Freytag; Vienna: F. Tempsky, 1908.) Price 4 marks.

(4) *Anatomische Physiologie der Pflanzen und der Menschen.* By Prof. K. Smalian. Pp. 86. (Leipzig: G. Freytag; Vienna: F. Tempsky, 1908.) Price 1.40 marks.

(1) ALTHOUGH it is the general practice among teaching botanists to combine in lectures the explanation of physiological principles with descriptions of the organs involved, the combination of microscopical anatomy with physiology in a practical book is unusual. In the present instance there is complete separation into a course of microscopical exercises that occupies about three-quarters of the volume, and a set of physiological experiments and deductions. The anatomical course begins with a description of the necessary apparatus for microscopical technique, after which there follows a series of studies of the cell, stem, leaf, and root, nearly identical with the types in Strasburger's "Botanisches Praktikum," in so far as these relate to flowering plants. This part of the book is excellent, especially for teachers who wish to become thoroughly conversant with all details and skilled in manipulation. The directions are explicit, the hints on reagents and methods are practical, and the accom-

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paniment of typical illustrations will be found useful. The physiological course does not produce such a favourable impression. The conduction of water and salts bulks largely in the foreground, and, seeing that it is an unsolved problem, it would seem more rational to give it less prominence. Generally speaking, the experiments appear to have been chosen rather to demonstrate dogmatic ideas than to serve as exercises practicable for general students.

(2) It is an advantage to teachers to obtain an insight into the methods adopted in other classes than their own, and botanists will welcome this introduction to the botanical courses planned by Prof. Moll for students in the University of Gröningen. In the first place the author discusses the comparative uses of demonstrations and practical classes. In practical work, although duly insisting on the necessity for good drawings, he places a high estimate on carefully written descriptions, and in this connection details his schemes for ensuring completeness by taking each character in order. A general course of histology and anatomy is outlined in a series of two hundred and fifty exercises. Some of the specimens selected for examination are innovations, and the examples of bacteria, with hints for obtaining and cultivating them, are particularly useful. On the other hand, the studies of tissues are not well defined or complete; one observes also notable omissions in the systematic types, and a somewhat too rigid uniformity in the use of tests. A special syllabus of products included in the Dutch pharmacopœia is inserted for the benefit of pharmaceutical students in the university, but the most valuable feature is the list of special investigations suitable for advanced students, that are based on, and intended to repeat, original researches. The book can be recommended to teachers having a knowledge of the Dutch language, especially during the preparation of a course of practical botany, as likely to furnish them with new ideas.

(3) This volume consists of a collation of botanical descriptions and information arranged according to the natural orders. The author's object has been to present his information in an attractive form, and to depict the *tout ensemble* of the plant. In this respect he has been quite successful, but he might with advantage have brought into greater prominence the scientific principles of classification, and would thereby have rendered the book more suitable for the purpose intended, as a text-book for use in a "Realschule." The information relates to pollination devices, seed dispersal, and general ecology, also to common insect pests, plants of economic importance, and morphological peculiarities. The sequence is similar to that prescribed by Engler, but differs mainly in the treatment of the dicotyledons, where a beginning is made with the Ranunculaceæ while the Caryophyllaceæ and orders with imperfect flowers are deferred to the end of the Archichlamydeæ. The space devoted to the cryptogams is necessarily so limited that it would have been wiser to omit them and to have extended the account of some of the phanerogams. The book is well illustrated throughout, and is provided with thirty-six coloured plates that are beautifully reproduced. It is a book that would be appreciated by boys and many of their elders who take a keen interest in botany.

(4) It is rightly impressed upon students that the physiology of plants and animals shows certain features in common, whence it might be expected that there would be an advantage in treating the two subjects in one volume. In the present case there is no special attempt to compare the physiological activities in the two kingdoms. The first part provides a concise account of the elements of plant physiology, but is not written with the view of stimulating practical experiment; in fact, the few pieces of apparatus represented in the illustrations are open to serious criticism. The second part, dealing with human physiology, is almost more concerned with form than function.

ELEMENTARY PHYSICS.

(1) *The New Matriculation Heat.* Pp. viii+276; *The New Matriculation Light.* Pp. viii+282; *The New Matriculation Sound.* Pp. viii+211. (Cambridge: University Tutorial Press, Ltd., 1908.) Price 2*s.* 6*d.*, 2*s.* 6*d.*, and 2*s.* respectively.

(2) *A First Year's Course in Geometry and Physics.* By Ernest Young. Pp. xi+169. (London: G. Bell and Sons, 1907.) Price 2*s.* 6*d.*

(3) *A Second Year's Course in Practical Physics.* Pp. vii+148; *A Third Year's Course in Practical Physics.* By James Sinclair. Pp. viii+125. (London: B. Bell and Sons, 1907.) Price 1*s.* 6*d.* each volume.

(1) THESE manuals cover the ground of the London University matriculation syllabus in heat, light, and sound. The treatment is lucid and concise, and thoroughly in accordance with the most recent methods of teaching elementary physics. An outstanding feature of these books is the inclusion of a number of experiments which may be performed with the most simple and inexpensive apparatus, and from which satisfactory results may be obtained.

In the volume on "Heat" a chapter is devoted to methods of approximation, and this should prove extremely useful to the student in reducing observations of actual experiments or performing the numerical exercises with which the book is plentifully supplied. One notes with pleasure, in the chapter on hygrometry, the omission of the classic "Daniell." A simple method for determining the "thermal conductivity" of india-rubber is described in the chapter on heat conduction, and serves well enough to illustrate the definition to elementary students, a point which, as a rule, has been neglected in text-books of this standard. In Expt. 47, p. 135, paraffin wax is a somewhat unsatisfactory substance for the determination of melting point by the cooling-curve method, at least for beginners. On p. 140 it would have been better to use the term "latent heat of water" as synonymous with "latent heat of fusion of ice," and not "latent heat of ice."

The volume on "Light" calls for little comment. The optical formulæ are obtained by the usual geo-

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